

# **LTCC Basic Course**

**Title: Time Series Analysis**

**Basic Details:**

Core Audience: First year, statistics

Course Format: extended, 5 x 2hr lectures

**Course Description:**

The aim of this course is to introduce students to the statistical analysis of time series data and simple models, and showcase what time series analysis can be useful for. Topics include: autocorrelation, stationarity, trend removal and seasonal adjustment, basic time series models (e.g. ARMA) and their estimation, introduction to financial time series and the GARCH models. R demonstrations will also be included.

**Key words:** ARMA, GARCH, stationarity, univariate time series

**Syllabus:**

- (1) Introduction to time series analysis
- (2) Autocorrelation and Stationarity
- (3) ARMA models
- (4) GARCH models
- (5) [If time permits] Spectral analysis
- (6) [If time permits] Introduction to change-point analysis

**Recommended reading:**

- Peter J. Brockwell and Richard A. Davis, Introduction to Time Series and Forecasting
- Robert H. Shumway, David S. Stoffer, Time Series Analysis and Its Applications: With R Examples
- Christian Francq and Jean-Michel Zakoian, GARCH Models: Structure, Statistical Inference and Financial Applications

**Additional or optional reading:**

**Prerequisites:**

Background in Statistics and Probability

**Format:**

- Number of discussion/problem sheets: 4
- Electronic lecture notes: yes
- Necessary software: R
- Lecture/computer session/tutorial/discussion split (hours of each): [tentative] 8 hours of lectures and 2 hours of computer session

**Lecturer Details:**

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